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Minutes

International Committee on Systematics of Prokaryotes

Subcommittee on the taxonomy of phototrophic bacteria

Minutes of the meetings, 29 August 2006, Pau, France

Michael T. Madigan, *Secretary*
Johannes F. Imhoff, *Chairman*

Session 1 – Closed meeting

Minute 1. Call to order. The closed meeting was held on 29 August 2006 at the Palais Beaumont in Pau, France. The meeting was called to order by the chairman, Johannes F. Imhoff, at 20 : 05.

Minute 2. Record of attendance. The members present were R. W. Castenholz (Eugene, OR, USA), P. Caumette (Pau, France), F. Garcia-Pichel (Tempe, AZ, USA), V. M. Gorlenko (Moscow, Russia), J. F. Imhoff (Kiel, Germany), M. T. Madigan (Carbondale, IL, USA), A. Oren (Jerusalem, Israel), J. Overmann (München, Germany), A. Wilmotte (Liège, Belgium) and V. Yurkov (Winnipeg, Manitoba, Canada). Apologies were received from M. Herdman (Paris, France), A. Hiraishi (Toyohashi, Japan), R. Rippka (Paris, France) and S. Ventura (Florence, Italy).

Minute 3. Approval of agenda. The agenda, as amended, was approved.

Minute 4. Minutes of the previous meeting. The minutes of the previous meeting, held in Tokyo, Japan, on 27 August 2003, were approved unanimously.

Minute 5. Chairman's report. The chairman informed the subcommittee on the current state of recommended standards for the description of new species of anoxygenic phototrophic bacteria and of cyanobacteria. Recommended standards for the description of new species of anoxygenic phototrophic bacteria were published in 2004 [Imhoff & Caumette, *Int J Syst Evol Microbiol* **54** (2004), 1415–1421]. Recommended standards for the description of species of the cyanobacteria are in a highly advanced state, but have been held back (see Minute 16).

After many years of processing, the second volume of the second edition of *Bergey's Manual of Systematic Bacteriology* treating the *Proteobacteria* and including purple sulfur and purple non-sulfur bacteria was finally published in 2005. It was pointed out that the chapters on phototrophic proteobacteria are not really up to date, because they were written in 1997 and, unfortunately, the final update was accepted in 2000. A number of higher taxa have been established and most genera of phototrophic purple bacteria were assigned to new families and orders. The purple sulfur bacteria families *Ectothiorhodospiraceae* and *Chromatiaceae* are assigned to the order *Chromatiales*. *Rhodocyclus* is in the family *Rhodocyclaceae* and order *Rhodocyclales*, *Rhodobacter* (with *Rhodobaca* and *Rhodovulum*) is in the *Rhodobacteraceae* and *Rhodobacterales*, *Rhodospirillum* and others are in the *Rhodospirillaceae* and *Rhodospirillales*. Altogether, the purple non-sulfur bacteria are placed into eight families and five orders. An introductory chapter for these bacteria (and another for the 'ABC bacteria', the aerobic bacteriochlorophyll-containing bacteria of the *Alphaproteobacteria*) is included in the second edition of *Bergey's Manual of Systematic Bacteriology* (vol. 2, part A).

Minute 6. Changes in membership. Ch. Sasikala (Hyderabad, India) was approved on a unanimous show of hands as a new member of the subcommittee.

Minute 7. Election of officers. Johannes F. Imhoff was re-elected as chairman for another period. Michael Madigan, who has been secretary for the past 9 years, stepped down from this post. The chairman and the subcommittee expressed their gratitude to M. Madigan for his work for the subcommittee. Annick Wilmotte was elected as the new secretary.

Minute 8. Next meeting. The next meeting of this subcommittee will be at the meeting of the International Symposium on Phototrophic Prokaryotes in Montreal in August 2009.

Minute 9. Adjournment. The closed meeting was adjourned at 20 : 25 on 29 August 2006.

Session 2 – Open meeting

Minute 10. Call to order. The open meeting was called to order by the chairman, Johannes F. Imhoff, at 20 : 35 on 29 August 2006.

Minute 11. Record of attendance. All those present at the closed meeting were present. In addition, H.-G. Trüper and E. Trüper (Germany), B. Heyduck-Söller (Germany), W. Serrano (Germany), K. Waleron (Poland), A. Ranchou-Peyruse (France), M. T. Nunez-Cardona (Mexico), C. Wiedner (Germany), J. Rücker (Germany),

K. Sivonen (Finland), L. Hoffmann (Luxembourg), R. Guyoneaud (France), D. Ionescu (Israel) and M. Bilys (Canada) attended the open meeting.

Minute 12. Chairman's report. The chairman pointed out that many positive responses in regard to the published recommended standards for the description of new species of anoxygenic phototrophic bacteria have demonstrated the urgent need for such a document and support the efforts made in this regard. He also stated that a similar document for the cyanobacteria, as discussed at the previous meeting, has been circulated and finalized for publication. However, the process was stopped because nomenclatural problems were brought up by subcommittee members and used as arguments not to publish the standards at the present time (see Minute 16).

In addition, he pointed out that information on this subcommittee is available from the website of the ICSP (http://www.the-icsp.org), including membership, taxa covered and minutes of previous meetings.

Minute 13. Phototrophic bacteria in culture collections. Discussion was lively on the lack of availability of national culture collections that are both able and willing to grow and maintain phototrophic prokaryotes. For valid publication of names of new taxa, two culture collections in different countries must hold and certify availability of the type strain. It was pointed out that exceptions to the 'two collections' rule have been made by the ICSP, but will not be granted lightly and only on a case-by-case basis. Almost everyone contributed with their own experience of long delays in species descriptions resulting from this issue or even the impossibility of publication, simply because of the inability of the culture collections to hold the strains. All agreed that most culture collections are neither equipped nor funded to grow anaerobic phototrophic prokaryotes and that, in many cases, the scientific personnel at the culture collection are incapable of growing all but very routine anoxygenic phototrophic bacteria. Though the problems were considered really serious for the anoxygenic phototrophic bacteria, they are even more severe with the cyanobacteria (with the current exception of the Pasteur collection in Paris). H.-G. Trüper suggested that the chair write to the head of the World Federation of Culture Collections about their inability to handle cultures of phototrophic prokaryotes and asking how they can or are willing to improve the situation.

Minute 14. New taxa described. A number of new taxa have been described during recent years, in particular many new ABC bacteria. There was not enough time to discuss all of them. Instead, a few groups were highlighted. V. M. Gorlenko reported on developments with *Ectothiorhodospiraceae* and discussed problems with the new genus and species '*Ectothiorhodosinus mongolicus*'. It was so far not possible to effect valid publication of the name of this bacterium because of the inability of culture collections to handle the type strain of this species.

V. Yurkov reported on the current situation of the taxonomy of the ABC bacteria. Many new species and also new genera have been described. Among the new genera are *Rhodovarius* (*Rhodovarius lipocyclicus*), *Roseisalinus* (*Roseisalinus antarcticus*), *Roseivirga* (*Roseivirga ehrenbergii* and *Roseivirga echinicomitans*), *Roseicyclus* (*Roseicyclus mahoneyensis*) and *Roseibacterium* (*Roseibacterium elongatum*). One of the major problems is that, in new species descriptions, the genus description is not always considered, and new species are included in genera defined as being aerobic phototrophic bacteria even though they do not contain bacteriochlorophyll and do not conform to the definition of the genus that they have been assigned to. Assignment is often made merely by 16S rRNA gene sequence similarity. Incorrect taxonomic treatment of new species is a matter of continued confusion in taxonomy (an example is the taxonomy of the genus *Roseobacter* and several species thereof) and therefore all attempts must be made to avoid incorrect description of new taxa. It was pointed out that, quite ironically, many of the papers proposing incorrect taxonomic changes or descriptions of taxa have passed through the review process of the IJSEM, but apparently and unfortunately not through the hands of competent members of this subcommittee. The chairman asked V. Yurkov to compile the present state of taxonomy in a paper to be published in IJSEM and to treat each of the incorrect issues formally and separately. The discussion (contributions from H.-G. Trüper, J. F. Imhoff and J. Overmann) on this topic focused on the significance of photosynthesis as a property that defines species and genera. No formal statement was made.

Minute 15. Three-letter abbreviations for genera. For new genera of anoxygenic phototrophic bacteria described in the past few years, the following abbreviations are proposed: '*Ectothiorhodosinus*', *Ets.*; *Rhodovarius*, *Rvs.*; *Roseisalinus*, *Ris.*; *Roseivirga*, *Riv.*; *Roseicyclus*, *Ric.*; *Roseibacterium*, *Rim.*

Minute 16. Nomenclature of cyanobacteria. The chairman pointed out that the subcommittee has now been unable to resolve this issue successfully for several decades and that there is an urgent need to find solutions. The state of the taxonomy and nomenclature of cyanobacteria is problematic. Major problems are due to the treatment of cyanobacteria in both the Botanical and Bacteriological Codes of Nomenclature. A. Oren gave a detailed overview of the current situation, including the widespread scattering of the botanical literature, the issue of priority of published new names and differences in living type strains versus non-living type specimens. Recent publications dealing with these problems include papers by Oren & Tindall [*Algol Stud* **117** (2005), 39–52] and Hoffman [*Algol Stud* **117** (2005), 13–29]. The conclusion of A. Oren was that now is not the right time for publication of a list of standards recommended for description of cyanobacteria, but that a solution to the basic nomenclatural problems should be awaited. He further pointed out that it is

currently almost impossible to validly publish the name of a cyanobacterial species name under the Bacteriological Code because of problems of nomenclature. However, the next formal meeting of representatives of the Botanical Code will not take place until 2011 and, according to A. Oren, no formal decisions can be made prior to this date. The chairman expressed his strong disappointment that the taxonomy of cyanobacteria will be again placed 'on hold' for many years and called for a speeding up of the matter.

Proposals from R. Rippka and M. Herdman (Pasteur Culture Collection of Cyanobacteria), communicated by J. F. Imhoff, strongly encouraged the development of minimal standards now and suggested the following activities:

a 'list of approved names of cyanobacteria' should be prepared as soon as possible;

a website should be created that would permit authors to consult the appropriate references, illustrations, synonyms etc.;

an approach similar to the 'list of *Candidatus*' could be introduced: the names of new cyanobacterial genera or species would only be validly published after a delay of 1–2 years, during which time objections concerning their nomenclature can be made.

Subcommittee support for the concept of a list of approved names of cyanobacteria and for publishing such a list as soon as possible was very strong. The immediate formation of a committee or working group of botanists and bacteriologists to work out a list of approved names, to reconcile differences in the two codes in order to describe and name cyanobacteria properly and to propose solutions for the problems of nomenclature well before 2011 was proposed and strongly supported by the subcommittee. Such a committee could work towards the target date of 2011, to have proposals ready for consideration and decision at the next formal meeting of representatives of the Botanical Code. It was pointed out that the working group could develop proposals by email correspondence and hold meetings via electronic means. As members of this committee, A. Oren, L. Hoffmann and A. Wilmotte were nominated, and it was proposed that the committee start its work immediately. The chairman asked to be informed about all future steps and activities.

Minute 17. Adjournment. The open meeting was adjourned at 23 : 05 on 29 August 2006.